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ABSTRACT

The methods of management science have been increasingly helpful to colleges and universities in evaluating alternatives, both instructional and administrative, and in determining the most efficient allocation of their resources. This article discusses ways in which systems techniques can be used to support the humanistic efforts so highly valued in the existing educational system. It examines one of these techniques, cost benefit analysis, with particular emphasis on its usefulness in evaluating nontraditional education. A cost benefit analysis is a quantitative, evaluative technique that relates the total benefits of a program to total costs of the program. It is an analytic study designed to assist decision makers by providing a criterion for identifying a preferred choice among a number of competing alternatives. It provides information on how to maximize or optimize a desirable measure of output, given a set of limited resources, including a budget constraint. The two broad areas discussed are the need for cost benefit analysis in nontraditional education and practical suggestions and steps necessary to carry it out. (Author/JMF)

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Cost-Benefit Analysis in Nontraditional Education

by Charles A. Parker

The methods of management science have been increasingly helpful to colleges and universities in evaluating alternatives, both instructional and administrative, and in determining the most efficient allocation of their resources. Many educators have retained a healthy skepticism of these methods and have questioned their appropriateness within a human service environment. They point out that, since the goals of industry differ significantly from those of education, such methods may be of doubtful value in education. Some argue that systematizing education will destroy the humanistic approach they value so highly, and that ordering and qualifying will impair the basic aims of education.

This article discusses ways in which systems techniques can be used to support humanistic efforts. It examines one of these techniques—cost-benefit analysis—with particular emphasis on its usefulness in evaluating nontraditional education. A cost-benefit analysis is a quantitative, evaluative technique that relates the total benefits of a program to total costs of the program. It is an analytic study designed to assist decision makers by providing a criterion for identifying a preferred choice among a number of competing alternatives. It provides information on how to maximize or optimize a desirable measure of output, given a set of limited resources, including a budget constraint.

Two Broad Areas Discussed

Two broad areas are discussed below: the *need* for cost-benefit analysis in nontraditional education and *practical suggestions and steps necessary* to carry it out. Included are several specific examples from the Community College of Vermont, for which a cost-benefit study was completed in late 1972, and which uses this technique in its planning and budgeting process. The Community College is a nontraditional, noncampus, community-oriented, two-year state college that utilizes existing facilities and community resources and operates in various regional locations that serve approximately half the geographical area of Vermont. The College emphasizes education for the disadvantaged, offers courses based on student demand, and has competency-based degree programs. Students are encouraged to become actively involved in their own program development and evaluation.

Need Is Both Internal and External

The need for cost-benefit analysis in nontraditional education is both internal and external. Internally, cost-benefit analysis serves as a management tool in the planning and budgeting process. It is utilized in evaluating alternatives among proposed programs for achieving various college objectives. For example, a college objective may be to attract fifty percent of its students from low-income families. Should the institution employ special, professional counselors to work on outreach and recruitment, or should it hire, on a part-time basis, low-income students who currently are working on counseling degrees? There are both obvious and disguised costs and benefits in each alternative.

A cost-benefit analysis could be utilized to evaluate the alternatives and to provide a criterion for ranking and selection; that is, to select first the alternative with the largest total benefit to total cost ratio. Since some costs and benefits—especially benefits—probably will be quantifiable only as estimates, the final selection depends on the judgment of the decision maker. Although humanistic considerations may necessitate selection of a suboptimal

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alternative in terms of the benefit-cost ratio, this technique provides the decision maker with meaningful information.

A cost-benefit analysis is particularly useful in nontraditional education, since education of this type frequently is less constrained by such factors as tenured faculty and investment in high-fixed-cost buildings and equipment. With fewer constraints, more alternatives are available. Many nontraditional teaching techniques are more expensive than traditional techniques per student contact-hour; examples include independent studies, tutorials, off-campus studies, and remedial studies. These techniques may be necessary to meet the unique needs of a particular clientele and, therefore, also have increased benefits.

Differences Warrant Careful Analysis

Many students in nontraditional education hold full-time jobs, which avoids the real cost inherent in traditional education: forgone wages of its students. It often is argued that this is the largest single cost of traditional education. Students who can continue valuable work experience while in school contribute to the economic well-being of their community and state. Differences such as these between traditional and nontraditional education are sufficiently important to warrant careful analysis.

Externally, a cost-benefit analysis serves as a vehicle for information sharing. As college managers attempt to determine internally the most efficient allocation of available funds, they also must provide support and justification for budget requests from legislatures and other external sources. A cost-benefit analysis can provide validation for funding requests and become an integral part of the funding process. It also can serve to illustrate how priorities are determined for programs and how the internal decision process works. This is particularly useful when outsiders argue that increased funding requests support a continually expanding bureaucracy, with little relationship to actual changing needs.

Originally funded by the Office of Economic Opportunity, the Community College of Vermont was accepted by the board of the Vermont State Colleges as a fifth state college in September 1972. The Community College then presented to the Vermont legislature a budget request for state funds to partially support operations in fiscal year 1974. The legislature also was provided with a cost-benefit analysis to judge the feasibility of funding the Community College.

The other purpose of the analysis was to provide the Community College with base-line information for internal management decisions. This cost-benefit analysis was an initial step in a movement to develop a comprehensive planning, programming, budgeting, and evaluation system, and the technique of cost-benefit analysis continues to be an integral part of the system.

Practical suggestions for implementing an effective cost-benefit analysis are presented below, and represent a mixture of technical and human process skills. It is important to understand the needs of the report's various audiences. Internally, managers need clear, concise, comprehensible information for use in the performance of their jobs. This means the analyst must discuss with the staff their various informational needs, then analyze the information and create a presentable reporting format.

Externally, the problem of clarity is magnified. The analyst must eliminate jargon, which would be misunderstood or which would annoy readers. Also, in the process of creating a research design, it is important to examine and discuss the needs of the external audiences in order to avoid reports that do not result in constructive change. A technically excellent report is useless if its conclusions are ignored.

It is also useful to establish a means for the various persons involved to present comments, questions, and problems. This information can be utilized in updating the study in order to provide better information on a continuous basis.

Suggested Procedure Presented

More technical steps are needed to insure an orderly process in the analysis. These steps are presented below as a suggested procedure that seems convenient, logical, and useful; they may be modified or supplemented to meet individual needs of the user.

1. *Identify the objectives of the decision makers.* Program objectives or desired program outcomes must be specified. The legislature's objective may be to provide higher education for all residents of the state. Or there may be the desire for one prestigious institution that attracts students from all over the world. Individual college presidents may be interested in serving a certain select group within the total student population, such as high school graduates at the top of their class or disadvantaged adults.

2. *Identify alternative means of obtaining the decision makers' objectives.* Alternative programs for implementing objectives must be stated so that the results of any given program are related to requirements. Frequently this is the most difficult step; generating good alternatives requires imagination.

3. *Identify costs and benefits of the various alternatives.* The next step in a cost-benefit analysis is identification of costs and benefits of alternative programs. Both individual and social costs must be quantified in monetary terms. This may be a problem, since many of the benefits and some of the costs of a social program do not lend themselves to quantification.

Individual or private benefits are defined as the welfare gained by a student as a result of education. They include:

a. additional earnings attributable to education, net of taxes.
b. employee benefits associated with additional earnings.
c. stipends received while the student is enrolled in an educational program.
d. the value of the option to enter other educational programs in the future.

Benefits to society or welfare gained by society as a result of education include:

a. gross additional earnings of individuals, attributable to education.
b. the effects of reducing transfer payments.
c. better citizenship.
d. reduced costs of bad citizenship.

Costs for an individual to invest in an education include:

a. the cost of not being able to work simultaneously in the labor market.
b. the cost of forgone leisure.
c. the inability to engage in production at home.
d. tuition and fees charged.

Social costs incurred by educating individuals include:

a. current costs, such as heat, light, and teachers' salaries.
b. capital costs for instructional equipment and physical plant.
c. forgone earnings of students.

These lists are given as examples. Each educational program will have varying costs and benefits, which must be identified.

4. *Develop a model to predict future costs and benefits.* Following a quantification of costs and benefits in monetary terms, the future costs and benefits should be discounted to the present. Both costs and benefits occur over a period of time and therefore must be converted to present values. This is accomplished by discounting future costs and benefits back to the present at an appropriate rate. The discounted costs and discounted benefits then are summed to obtain the present value of benefits and present value of costs. Much has been written concerning the appropriate rate of discount for use in evaluating educational programs; the analyst should examine this literature and choose the appropriate discount rate for the situation.

5. *Provide a criterion for ranking alternatives.* The benefit-cost ratio equals the present value of benefits divided by the present value of costs. The decision rule then becomes: choose first the alternative having the highest benefit-cost ratio. Alternatives with benefit-cost ratios less than one should not be chosen.

There are a number of conceptual and practical problems involved in the application of cost-benefit analysis to education. First, accumulation and analysis of information never will replace judgment. Only the decision maker can reflect the final priorities established for the institution. Additional criteria of a noneconomic nature, such as humanistic considerations, may affect the final decision-making process.

Other problems are:

1. The treatment of benefits that cannot be measured in monetary terms.

2. The comparison of monetary benefits among different persons.

3. The treatment of benefits that accrue outside a particular community.

It should not be concluded that these problems void the usefulness of a cost-benefit analysis. The point is to understand the strengths and weaknesses of the tool and therefore be able to use it properly.

Five Steps of Cost-Benefit Analysis

The five steps of a cost-benefit analysis for the Community College materialized as follows:

1. The study assumed, based on comments from legislators, educators, and state personnel, that one objective of decision makers was to provide higher education for Vermonters. Statistics indicated that only thirty-four percent of Vermont high school graduates ente college, compared to the national average of fifty-seven percent. This indicated that the objective was not being met and that corrective measures were necessary.

2. The most feasible alternatives appeared to be to:
   a. expand existing, public facilities of higher education.
   b. construct other public, campus-based facilities.
   c. fund existing private institutions.
   d. fund the Community College.

3. The first three alternatives involved costs per full-time equivalent student of at least that of existing state colleges. Also, estimates placed the starting-up cost of a new institution (alternative 2b above) at $14,000,000. The cost per full-time equivalent student at the Community

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College is about sixty percent of that of other state colleges, and the cost of forgone wages is avoided, since students work while attending school. The tuition charge is significantly less than that of other state colleges.

The cost benefit analysis carefully examined benefits associated with programs of the Community College. These programs provided higher education to individuals in rural Vermont who otherwise could not have received this service. Statistics indicate that persons with associate degrees, on the average over their lifetimes, earn more than persons with only high school diplomas. This not only benefits the individuals, but also increases taxable income and reduces transfer payments.

4. Below is a present value model that was used to deal with future earnings.[1] A similar model is used for other benefits and costs when they extend over a number of years.

A present value model is an analytical device to evaluate costs and benefits, both present and future, in terms of current dollars. It is a technique, frequently used in evaluating investments, for ranking alternatives that last over many years.

$$Va = \sum_{N=A}^{64} \frac{YaPn\,(1+X)^{N} - A + 1}{(1+R)^{N} - A + 1}$$

where:

Va = the present value of all allocative educational benefits from age A through age 64.

A = the average age of students receiving degrees from Community College.

Ya = the annual increase in earnings associated with the education.

Pn = the survival rate to age 65.

R = the discount rate used to convert future earnings to their present value.

X = the annual increase in earnings level due to rising productivity.

[1] This model is a modified version of one in Herman P. Miller et al. *Present Value of Estimated Lifetime Economics.* (Washington, D.C.: U.S. Department of Commerce, Bureau of the Census, 1967), p. 2.

5. The criterion for ranking the four alternatives mentioned in (2) above is the benefit-cost ratio. Costs of the Community College are less, both direct and indirect. Also, its benefits are greater for the clientele it serves.

Conclusion

Declining enrollments, budget reductions, and increased demands for accountability have motivated educational planners and managers to review their management science techniques. One of these techniques, cost-benefit analysis, serves both internal and external needs. Internally it is a management tool, an integral part of the planning and budgeting process. It is particularly useful for nontraditional education, since this type of education frequently is less constrained than traditional education. Screening and evaluation procedures must take into account the greater number of alternatives available in this type of education. Externally, a cost-benefit analysis is an integral part of the funding process. It serves as a vehicle to share information and to support and justify budget requests.

Practical suggestions needed to carry out an effective cost-benefit analysis include:

1. Understanding information needs of various audiences.
2. Identifying objectives of the decision maker.
3. Identifying alternative means of obtaining these objectives.
4. Identifying costs and benefits of various alternatives.
5. Developing a model to predict future costs and benefits.
6. Providing a criterion for ranking alternatives.
7. Keeping in mind that the final choice is that of the decision maker, who may elect to consider additional criteria of a noneconomic, humanistic nature.

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